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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/775,106	02/01/2001	Gerard A. Mourou	UMJ-939-R	4544

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EXAMINER

EVANS, GEOFFREY S

ART UNIT	PAPER NUMBER
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1725

DATE MAILED: 04/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/775,106

Applicant(s)

MOUROU ET AL.

Examiner

Geoffrey S. Evans

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 November 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 46-105 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 46-105 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 20040721, 20040930, 20041028

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. In accordance with 37 CFR 1.175(b)(1), a supplemental reissue oath/declaration under 37 CFR 1.175(b)(1) must be received before this reissue application can be allowed.

Claims 46-105 are rejected as being based upon a defective reissue declaration under 35 U.S.C. 251. See 37 CFR 1.175. The nature of the defect is set forth above.

Receipt of an appropriate supplemental oath/declaration under 37 CFR 1.175(b)(1) will overcome this rejection under 35 U.S.C. 251. An example of acceptable language to be used in the supplemental oath/declaration is as follows:

"Every error in the patent which was corrected in the present reissue application, and is not covered by a prior oath/declaration submitted in this application, arose without any deceptive intention on the part of the applicant."

1. Claim 52 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. There is no support in U.S. Patent No. 5,656,186 that the material being machined can be a semiconductor as recited in claim 52.

Applicant cannot successfully argue that Applicant by contemplating the genus of all materials for the process entitles Applicant to now claim the species of semiconductors for use in the process. See Ex Parte Klager, 132 USPQ 206,207 '... as a matter of law, an applicant cannot include and claim a specific thing not originally described, merely because it comes within the scope of the genus before disclosed.'

2. Claims 56,59-61,67, 81-101 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. In claims 56,81,86,91,96,101 there is no disclosure of focusing the beam, but that is the only method disclosed in U.S. Patent No. 5,656,186 for directing the beam "beneath the surface of the material". Applicant's amendment to claims 56 and 67 to recite a "beam waist" is not sufficient to overcome this rejection since the claim does not specify that the beam waist is beneath the surface of the material. Please note that independent claims 81,86,91,96,101 recite a "Rayleigh range" that requires a focused beam to be present.

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting

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directly or indirectly from an international application filed before November 29, 2000.

Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

4. Claims 46,48,49,50,51/46,51/48,51/49,51/50,52/46,52/48, 52/49,52/50, 55/46, 55/48, 55/49, 55/50,57/46,57/48,57/49,57/50 ,58/46,58/48,58/49, 58/50,61/56/46, 61/55/48, 61/56/49, 61/56/50,62/55/46,62/55/48,62/55,49,62/55/50,63/46,63/48,63/49, 63/50,69/46,69/48,69/49,69/50,70/46,70/48,70/49,70/50,72/46,72/48,72/49,72/50,73/46, 73/48,73/49,73/50 and 78 are rejected under 35 U.S.C. 102(b) as being anticipated by Ihlemann et al. in the article "Nanosecond and Femtosecond Excimer Laser Ablation of Fused Silica". Ihlemann et al. discloses as shown in figure 1 laser ablation of a transparent dielectric material (SiO_2) by making holes with pulses of 500 femtoseconds duration, which is far less than a pulse width of 10 picoseconds which is disclosed as the point at which the machining is essentially accurate with this material. Since Ihlemann et al. discloses a pulse width shorter than 10 picoseconds inherently under Applicant's discovered law of nature (the log-log relationship between fluence threshold at which breakdown occurs versus laser pulse width, the relationship exhibiting a distinct change in slope with respect to decreasing pulse width to a nearly constant value) the laser pulse ablation of Ihlemann et al. must also be subject to the same law of nature. See EMI Group North America Inc. v. Cypress Semiconductor Corp., 60 USPQ 1423,1430 (CAFC 2001) which states "Recitation of a law of nature does not distinguish a claim from prior art. Funk Bros. Seed Co. v. Kalo Inoculatn Co., 333 U.S. 127,130 (1948) ("[M]anifestations of laws of nature [are] free to all men and reserved

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exclusively to none. He who discovers a hitherto unknown phenomenon of nature has no claim to monopoly of it which the law recognizes.”). Similarly Ihlemann et al.’s pulse width must be below the pulse width at which the laser induced breakdown becomes essentially accurate and the point at which the size of the feature is not limited by thermal diffusion and the pulse width of Ihlemann et al. is sufficiently short that the affected area is substantially determined by solely by the beam shape and fluence in relation to the threshold for laser induced breakdown.

5. Claims 46,48-50,51/46,51/48,51/49,51/50, 52/46,52/48,52/49,52/50,55/46, 55/48, 55/49,55/50,57/46,57/48,57/49,57/50,58/57/46,58/57/48,58/57/49,58/57/50,62/46,62/48, 62/49,62/50,63/46,63/48,63/49,63/50,65/46,65/48,65/49/65,50,68/46,68/48,68/49,68/50, 69/46,69/48,69/49,69/50,71/46,71/48,71/49,71/50,72/46,72/48,72/49,72/50,73/46,73/48, 73/49,73/50 and 78 are rejected under 35 U.S.C. 102(e) as being anticipated by Alexander in U.S. Patent No. 6,489,589 B1. Alexander discloses (see column 9,line 63 to column 10,line 38) laser machining stainless steel, gold, copper, iron, nickel, titanium, silicon and diamond (which is a transparent material) using pulses with a width of 150 femtoseconds duration , which is far less than a pulse width of 10 picoseconds which is disclosed by the instant application as the point at which machining is essentially accurate with this material. Since Alexander discloses a pulse width shorter than 10 picoseconds, inherently under Applicant’s discovered law of nature (the log-log relationship between fluence threshold at which breakdown occurs versus laser pulse width, the relationship exhibiting a distinct change in slope with respect to decreasing pulse width to a nearly constant value) the laser pulse ablation of Ihlemann et al. must

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also be subject to the same law of nature. See EMI Group North America Inc. v. Cypress Semiconductor Corp., 60 USPQ 1423,1430 (CAFC 2001) which states "Recitation of a law of nature does not distinguish a claim from prior art. Funk Bros. Seed Co. v. Kalo Inoculatn Co., 333 U.S. 127,130 (1948) ("[M]anifestations of laws of nature [are] free to all men and reserved exclusively to none. He who discovers a hitherto unknown phenomenon of nature has no claim to monopoly of it which the law recognizes.")'. Similarly Alexander's pulse width must be below the pulse width at which the laser induced breakdown becomes essentially accurate and the point at which the size of the feature is not limited by thermal diffusion and the pulse width of Alexander is sufficiently short that the affected area is substantially determined by solely by the beam shape and fluence in relation to the threshold for laser induced breakdown.

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

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consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 47,51/47,52/47,55/47,56,59,60,61,58/47,62/55/47, 63/47,65/47,66/47, 69/47,70/47,71/47,72/47,73/47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ihlemann et al. in the article "Nanosecond and Femtosecond Excimer Laser Ablation of Fused Silica" in view of Lai in U.S. Patent No. 5,984,916. Ihlemann et al. discloses as shown in figure 1 laser ablation of a transparent material (SiO_2) by making holes with pulses of 500 femtoseconds duration. Lai as shown in figure 5 teaches creating an interaction zone that is smaller than the wavelength of the laser beam beneath the surface of the workpiece. It would have been obvious to adapt Ihlemann et al. in view of Lai to provide this to decrease the size of the part of the workpiece that has material properties change.

9. Claims 64/46,64/48,64/49 and 64/50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ihlemann et al. in the article "Nanosecond and Femtosecond Excimer Laser Ablation of Fused Silica" in view of Mourou et al. in U.S. Patent No. 5,235,606. Mourou et al. (606) teaches generating a short optical pulse by stretching the pulse in time, amplifying the pulse, and recompressing the amplified pulse. It would have been obvious to adapt Ihlemann et al. in view of Mourou et al. to provide this to create a short high peak power pulse.

10. Claim 64/47 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ihlemann et al. in view of Lai in U.S. Patent No. 5,984,916 as applied to claim 47 !!!! above, and further in view of Mourou et al. in U.S. Patent No. 5,235,606. Mourou et al.

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(606) teaches generating a short optical pulse by stretching the pulse in time, amplifying the pulse, and recompressing the amplified pulse. It would have been obvious to adapt Ihlemann et al. in view of Lai and Mourou et al. to provide this to create a short high peak power pulse.

11. Claims 65/46,65/48,65/49,65/50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ihlemann et al. in view of Stuke et al. in U.S. Patent No. 5,243,589. Stuke et al. teaches machining with femtosecond laser pulses by scanning a laser beam relative to a workpiece by moving the workpiece (e.g. see column 2, lines 35-37). It would have been obvious to adapt Ihlemann et al. in view of Stuke et al. to form a groove or textured surface along the workpiece surface.

12. Claims 47,51/47,52/47,55/47,56,57/47,58/47,59, 60,61,62/47,63/47,65/47,66, 68/47,69/47,70/47,71/47,72/47,73/47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alexander in U.S. Patent No. 6,489,589 B1 in view of Lai in U.S. Patent No. 5,984,916. Lai as shown in figure 5 teaches creating an interaction zone that is smaller than the wavelength of the laser beam beneath the surface of the workpiece. It would have been obvious to adapt Alexander in view of Lai to provide this to decrease the size of the part of the workpiece that has material properties change.

13. Claims 64/46,64/48,64/49, and 64/50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alexander in U.S. Patent No. 6,489,589 B1 in view of Mourou et al. in U.S. Patent No. 5,235,606. Mourou et al. (606) teaches generating a short optical pulse by stretching the pulse in time, amplifying the pulse, and recompressing

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the amplified pulse. It would have been obvious to adapt Alexander in view of Mourou et al. to provide this to create a short high peak power pulse.

14. Claim 64/47 is rejected under 35 U.S.C. 103(a) as being unpatentable over Alexander in view of Lai as applied to claim 47 above, and further in view of Mourou et al. in U.S. Patent No. 5,235,606. Mourou et al. (606) teaches generating a short optical pulse by stretching the pulse in time, amplifying the pulse, and recompressing the amplified pulse. It would have been obvious to adapt Alexander in view of Lai and Mourou et al. to provide this to create a short high peak power pulse.

15. Claims 53/52/46,53/52/48,53/53/49,53/52/50,54/53/52/46, 54/53/52/48, 54/53/52/49,54/53/52/50,79, and 80 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alexander in view of Wojnarowski et al. in U.S. Patent No. 5,104,480. Wojnarowski et al. teaches laser machining gold (see column 7,line 19) above a substrate of glass (see column 6,line 64) to create a conductive pattern for an integrated circuit. It would have been obvious to adapt Alexander in view of Wojnarowski et al. to provide this to create an integrated circuit on the substrate.

16. Claims 53/52/47,54/53/52/47,68/47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alexander in view of Lai as applied to claim 47 above, and further in view of Wojnarowski et al. in U.S. Patent No. 5,104,480. Wojnarowski et al. teaches laser machining gold (see column 7,line 19) above a substrate of glass (see column 6,line 64) to create a conductive pattern for an integrated circuit. It would have been obvious to adapt Alexander in view of Lai et al. and Wojnarowski et al. to provide this to create an integrated circuit on the substrate.

17. Claims 64,74-77,81-105 patentably define over the over the art of record but have been rejected as stated above.

18. Applicant's arguments filed 30 September 2004 have been fully considered but they are not persuasive. Applicant argues that since the disclosure provides support for organic material, and organic semiconductors are known, the disclosure provides support for semiconductors. Firstly, there is no support in U.S. Patent No. 5,656,186 of organic semiconductors (a species of organic materials) from the disclosure of another organic material. Secondly, even if there was support for organic semiconductors in the original U.S. Patent No. 5,656,186, that would not provide support for all semiconductors which includes nonorganic semiconductors. Applicant further argues that an amendment to claims 56 has rendered the rejection of this claim under 35 U.S.C. 112 , first paragraph moot. This is not persuasive since the claim as most recently amended does not require the beam waist to be beneath the surface of the workpiece. Applicant further argues on page 22 of the Remarks that Ihlemann et al. fails to "recognize the relationship between fluence breakdown threshold and pulse width". However this is part of the natural law discovered by Applicant and is not patentable subject matter. The real issue is whether the laser pulses of the Ihlemann et al. and Alexander references are short enough to be inside the ranges defined by Applicant's claims. Please note that none of the claims require any specific energy level (as long as the laser pulse energy is strong enough for ablation to occur at the specific pulse width used). The meaning of the phrase "essentially accurate" is not defined in the instant specification and hence these words are being given their ordinary

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meanings (from a standard dictionary). Ihlemann et al. recognizes the desirability of machining at low ablation levels for essentially accurate machining (see page 367, second column, lines 29-31 "There is gentle etching at low ablation rate followed by explosive sputtering at high ablation rate"). Alexander in U.S. Patent No. 6,489,589 also recognizes that using femtosecond laser pulses causes material to be removed without any significant heat transfer (see column 9, lines 38-40 of Alexander). Since Alexander machines without significant heat transfer to the surrounding areas of the workpiece the machining the surrounding areas are not significantly affected (e.g. melted) and machining is essentially accurate.

19. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

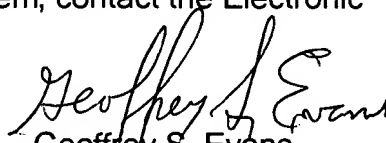
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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Geoffrey S Evans whose telephone number is (571)-272-1174. The examiner can normally be reached on Mon-Fri 6:30AM to 4:00 PM, alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Dunn can be reached on (571)-272-1171. The fax phone number for the organization where this application or proceeding is assigned is (703)-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private Pair only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 886-217-9197(toll-free).

GSE


Geoffrey S. Evans
Primary Examiner
Group 1700